

**Program Assessment Report  
B.S. in Crop Science  
University of Arkansas  
Academic Year 2022-2023**

**1. Department Name & Contact Information**

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**2. Department Mission**

The mission of the Department of Crop, Soil, and Environmental Sciences is to provide superior education programs at the undergraduate and graduate levels, conduct innovative research and extension programs in the crop, soil, and environmental sciences and provide superior service for citizens of Arkansas and the nation.

**3. Program Goals**

1. Graduates have the discipline-specific knowledge in crop sciences required to perform successfully in private, government, or academic entry-level positions.
2. Graduates are able to critically analyze, synthesize, and evaluate new information to make informed decisions.
3. Graduates have the ability to solve complex, multidisciplinary problems.
4. Graduates are able to prepare and synthesize information to effectively communicate, both orally and in writing.

**4. Student Learning Outcome 1.** Students will demonstrate the discipline specific knowledge required to function as crop science professionals.

**A. Assessment Measure for Outcome 1**

- Achievement is measured using **pre- and post-assessment**.
- This is a **direct** measure of student learning.
- Pre- and post-assessment includes 25 test questions from the CPSC faculty covering crop science/physiology, weed science/pest management, crop production, and soil fertility/plant nutrition. These areas represent essential concepts for discipline-specific knowledge of students completing a crop science degree.
- The initial pre- and post-assessment was generated by the CPSC faculty during the spring 2016. Target populations are at least half of the (incoming) and half of the fall graduating CPSC class.
- Scores are calculated for each assessment with the range, average, and median calculated for the cohort of pre- or post-assessments. We target calculation of the change in scores from pre- to post-assessment.

**B. Acceptable and Ideal Targets** (not required for indirect measures)

- Acceptable: We are targeting a 50% increase in the mean and/or median test scores between the two populations (incoming and graduating students).

- Ideal: We are targeting a 75% increase in the mean and/or median test scores between the two populations (incoming and graduating students).

#### C. Summary of Findings

- Median post-test scores improved from 46% to 72% representing a 57% increase from the pre-test to post-test scores. The score improvement exceeded the acceptable increase of 50% gain in scores between the pre-test and post-test.

#### D. Recommendations

- The CSES Department has hired several new faculty and the CPSC curriculum is undergoing revision. It seems that a review of the questions on the pre-test/post-test would be helpful at this point to ensure that the assessment technique for student learning outcome 1 remains on target.
- The target course for pre-testing should be selected to capture CPSC students entering the major as freshmen, or as new students, in the first semester of enrollment.
- The target course for post-testing should continue to be CSES 4013. CSES 4013 was moved to spring semester a few years ago to help with scheduling and should capture students who are close to graduating in their final semester.

### 5. Student Learning Outcome 2. Students will demonstrate the ability to critically evaluate situations or scenarios to arrive at well thought out and supported decisions and outcomes.

#### A. Assessment Measure for Outcome 2

- Achievement will be measured using a critical thinking scenario and assessed using a **critical thinking rubric**.
- This is a **direct** measure of student learning.
- Assessment scenarios will be generated to cover application of critical thinking in crop science contexts.

#### B. Acceptable and Ideal Targets (not required for indirect measures)

- Acceptable: 50% of seniors assessed will score proficient or greater.
- Ideal: 75% of seniors assessed will score proficient or greater.

#### C. Recommendations

- Critical thinking was not evaluated for CPSC in 2022-2023. Courses in the CPSC curriculum are undergoing revision. With course and curriculum revision, CSES faculty should consider how best to assess critical thinking as a student learning outcome in the CPSC curriculum. An option may include a critical thinking exercise on the post-assessment targeting learner outcome #1 that would be scored independently using the critical thinking rubric.

### D. Student Learning Outcome 3. Students will demonstrate the ability to work through and solve complex, multidisciplinary problems.

### 6. Assessment Measure for Outcome 3

- A. Achievement will be measured using a problem-based scenario and scored using a **problem solving rubric**.
- This is a **direct** measure of student learning.

- CSES 4224 Soil Fertility, a required course for all CPSC students, is the target course for the problem solving assessment.
- Assessment scenarios cover application of problem solving in crop science contexts.

**B. Acceptable and Ideal Targets** (not required for indirect measures)

- Acceptable: 50% of seniors assessed will score proficient or greater.
- Ideal: 75% of seniors assessed will score proficient or greater.

**C. Summary of Findings**

- During 2022-2023, nine CPSC students were evaluated during a multi-step computational and decision-making problem-solving exercise from CSES 4224 Soil Fertility. Students were assigned a complex problem where they first manipulated real-world data and then had to assess the results, explaining their rationale and justification for their interpretations. Each student was asked to justify how and why they did what they did and interpret their results in a >1-page summary. The summary is a large component of the focus for applying the assessment rubric.
- Scores for all components rated a median level of proficient. More than 75% of the students were proficient in evaluating solutions and implementing solutions.

**D. Recommendations**

- The target was reached of at least 50% of students achieving a proficient level in problem solving. Problem solving requires comprehension, application, analysis, synthesis, and evaluation, i.e. learning at high cognitive levels. In general, faculty should continue to consider and articulate where and when students have opportunities to develop (learn and repeatedly practice) cognitive skills in problem solving across the curriculum.

**7. Student Learning Outcome 4a.** Students will demonstrate the skills required to effectively communicate technical/scientific information in oral platforms.

**A. Assessment Measure for Outcome 4a**

- Achievement was assessed using an **oral communication rubric** during oral presentations where the student compiled and evaluated the scientific literature as part of a class project and/or completed an independent research project as part of a special problems, research project or internship class.
- CSES 3023 CSES Colloquium (FA), an upper division, professional development, communication-intensive course that should capture at least half of the senior population, is the target course for the assessment.
- CSES 462V Internship, Special Problems, and Honors thesis defenses provide opportunities where students present their experiences to an audience and the oral communication rubric can be used to evaluate communication skills.
- This is a **direct** measure of student learning.

**B. Acceptable and Ideal Targets** (not required for indirect measures).

- Acceptable: 60% of seniors assessed will score proficient or greater.
- Ideal: 80% of seniors assessed will score proficient or greater.

**C. Summary of Findings**

- CSES 3023 CSES Colloquium is required for CPSC students. Performance was evaluated during a 10-12-minute research presentation that was given by each student. Four students enrolled in the course during the fall 2022. The median score for organization, language, delivery, and central message was proficient (3.0), while the median was between basic and proficient (2.5) for supporting material.

#### D. Recommendations

- Using supporting material to deliver a scientific speech is an area in which the target proportion of students have not met target performance previously in addition to this year. An area to target for improvements in learning appears to be use of supporting material to establish credibility and/or authority on a subject.
- Oral communication skills are skills that employers often complain are lacking in college graduates. Supporting and effectively communicating a concise, well-supported scientific presentation can be difficult and development of these skills is critical to functioning in the workforce in the applied sciences.

### 8. Student Learning Outcome 4b. Students will demonstrate the ability to integrate, organize, and effectively present written reports of technical/scientific information.

#### A. Assessment Measure for Outcome 4b

- Achievement was assessed using a **written communication rubric** for laboratory reports and technical/scientific proposals where the student has analyzed, synthesized and evaluated information from independent sources as part of a class project and/or completed an independent research project as part of a special problems, research project or internship class.
- CSES 462V Internship, Special Problems, and Honors thesis research provide opportunities where students have completed independent research projects. Students enrolled in ENSC 3263 have to write papers in which they organize data and information they have analyzed, synthesized, and evaluated to clearly and fluently convey a message.
- This is a **direct** measure of student learning.

#### B. Acceptable and Ideal Targets (not required for indirect measures).

- Acceptable: 60% of seniors assessed will score proficient or greater.
- Ideal: 80% of seniors assessed will score proficient or greater.

#### C. Summary of Findings

- Between internship and ENSC 3263, writing skills for five students were evaluated during the 2022-2023 year.
- Of the five components evaluated, proficiency was achieved for 60% or more of CPSC students for context and purpose, genre and disciplinary conventions, and sources and evidence. However, median scores were basic (2.0) for content and development, and syntax and mechanics. Only one student demonstrated proficiency in content and development and none of students demonstrated proficiency in syntax and mechanics.
- As far as writing skills, students are not reaching 40% of the stated writing outcomes in the CPSC curriculum.

#### **D. Recommendations**

- Crop Science faculty should reevaluate how to incorporate more opportunities for writing into the curriculum for students to develop writing skills to better meet the student learner outcomes for written communication.

### **8. Results of Analysis of Assessment of Student Learning Outcome, including General Education student learning outcome 6.1**

The CPSC degree-seeking students were evaluated for knowledge, problem solving, and oral and written communication skills. Three years of problem solving assessment evaluated in CSES 4224 Soil Fertility, which is a required course in the CPSC degree program, indicates that problem solving development seems to be sufficient in the curriculum. Assessment of writing was incorporated with use of the assessment rubric applied to internship reports and a class assignment in ENSC 3263. Assessment of significant writing assignments highlights the need for evaluation of how to strengthen student learning of writing skills throughout the curriculum. Use of supporting material to support thesis statements is another area revealed through oral communication assessment that needs further consideration for development throughout the curriculum.

CSES 3023 CSES Colloquium is the course that meets General Education student learner outcome 6.1., to “gain the ability to synthesize, integrate, and apply knowledge developed throughout the undergraduate years”. As a required project in CSES 3023, students create a professional portfolio throughout the semester that contains work related to projects, their career development, and reflections of their self-learning and development. Students build their portfolio knowing that it is documentation to demonstrate achievement of student learner outcomes.

Upon course completion and reaching goals embodied in outcome 6.1, students write a 1250-word essay reflecting upon how the years of being an undergraduate student has prepared them to develop and use written, oral, and/or multimodal communication abilities; quantitative literacy; and critical thinking and/or ethical reasoning skills and abilities. Five CPSC students in CSES 3023 during the fall 2022 semester completed the e-portfolio and essay assignments, with 80% of the students demonstrating proficiency or mastery in student learner outcome 6.1.

### **9. Any Changes to Degree/Certificate Planned or Made on the Basis of the Assessment and Analysis**

The CPSC curriculum is undergoing revision to make the degree plan more streamlined. The CPSC degree supports a relatively large transfer student population, rather than attracting incoming high school graduates into the major as traditional freshmen. While there are considerations that should be accounted for in evaluating assessment data, including a small dataset of students who are evaluated each year, assessment information regarding writing development and learning to use reputable, reliable and relevant information to support thesis statements may assist in guiding considerations during CPSC curriculum revision.

### **10. Any Changes to the Assessment Process Made or Planned**

Inclusion of opportunities to assess critical thinking should be considered while CSES faculty are revising courses with new faculty and making revisions in the CPSC curriculum.

### **11. Supporting Attachments**

- Problem solving rubric adapted from Association of American Colleges and Universities
- Oral communication skills rubric adapted from Association of American Colleges and Universities

- Written communication skills rubric adapted from Association of American Colleges and Universities